Government of South Australia

SA Water

SA Water Regulatory Business Proposal 2016-2020

Attachment H
Supply optimisation review, MWH (Executive Summary)

Full report provided to ESCOSA

MWH

BUILDING A BETTER WORLD

FINAL REPORT

RBP16 Supply Mix Optimisation Modelling Review

Prepared for SA Water

April 2015

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EXECUTIVE SUMMARY

SA Water is required to develop a forecast operating plan for the upcoming regulatory period 2016/2017 – 2019/2020. This forecast plan provides input to budget forecasting, water supply security forecasting and operations management forecasting. To develop the operating plan, the Operations Control Group (OCG) have used the Distribution Optimisation Tool (DOT) which was designed and developed for SA Water in 2013/2014.

The optimisation tool is a mass balance model of the Adelaide network, taking into account water supply from the River Murray, bulk water reservoir storages, transmission mains and rivers, metropolitan water treatment plants and the metropolitan distribution network. The DOT uses a very large LP (linear program) with appropriate pre-processing of non-linear hydraulic relationships. DOT has a long term and a short term module that can be used for optimising different problems. The long term module runs with a weekly time step over a 2 year horizon and this was used to develop the operating plan for RBP16. Two optimisation sessions were run back-to- back to cover the 4 year period required for the operating plan.

The purpose of this report is to review the final solution (RBP16 Operating Plan) developed by SA Water. MWH was contracted in 2014 to assist in the setup and initial optimisation runs for the RBP16 plan. SA Water has now updated the optimisation model (new input data, constraints, etc) and developed a final solution and engaged MWH to review the final solution. The input data used in the final runs has been reviewed and provided in this report and the final solution has also been compared with the interim solutions developed in 2014 as part of checking the solution performance.

The final solution developed by SA Water correctly applied updated input data provided by a number of stakeholders within SA Water. Changes made to some of the constraints in the model (such as maximum flow) all were appropriate and drew on trends seen in the interim solutions, but applied more practical operating rules. These were all beneficial changes and allowed a balance between optimised solution costs and a solution that is not too difficult to operate in the field. Some of the key solution features include:

- There is no Excess Spill in the final solution
- There is flow from Millbrook to Kangaroo Creek via the dissipater at times
- There is flow from Mannum Adelaide pipeline to Little Para reservoir at times
- Anstey Hill Water Treatment Plant (WTP) receives water from both Mannum Adelaide pipeline and Millbrook reservoir, but not at the same time due to the constraints set in the model
- Little Para WTPis offline 3 months of the year, Hope Valley WTP is online at all times
- There is no pumping from Mannum Adelaide pipeline to Warren reservoir at all times
- The Northern and Western Transfers are used frequently in the metro network
- The Central transfer is not used and Eastern Transfer is only partial (no flow into Terminal Storage)
- Morgan-Whyalla pipeline operating cost is excluded from DOT modelling

The solution costs over each 12 month period of the 4 years are similar. As demands increase slightly and different electricity tariffs have been used across the years, some differences in costs are expected. The pumping strategy, the levels in the reservoirs and the mix of supply from the water treatment plants to the metro area are quite similar year to year.

Year	2016/2017	2017/2018	2018/2019	2019/2020
Major Pumping Energy Cost ($) (excl.Morgan-Whyalla pipeline)				
Total	[redacted]	[redacted]	[redacted]	[redacted]
Metro Pumping Energy Cost ($)				
Total	[redacted]	[redacted]	[redacted]	[redacted]
Treatment Cost ($) (incl. Swan Reach and Morgan WTPs)				
Total	[redacted]	[redacted]	[redacted]	[redacted]
Total cost excluding min-hydro revenue ($)				
Pumping+WTP	[redacted]	[redacted]	[redacted]	[redacted]